



Measuring and predicting gully growth in olive orchards: the importance of roots

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Gully erosion is now widely recognized as a key process contributing to land degradation, especially in semi-arid areas. However, in spite of numerous studies detailing gully volumes and growth rates, the underlying physical controls are still poorly understood.

This study focuses on the interaction between vegetation and gully expansion. In many olive orchards, permanent gully channels exist. It has been observed that these are often stable in length, but keep expanding in width due to sidewall failures. It is analysed how the location and magnitude of these failures is related to the root pattern of the olive trees. Sidewall failures negatively impact the production of the orchards, since a lot of failures cause trees to fall down the gully channel.

Gully evolution was measured between 1956 and 2010 with air photographs in a 2000ha area in SW Spain. Field measurements of gully morphology and root characteristics were made with RTK-GPS. The position of the individual olive trees was derived from orthophotographs. In order to predict the future evolution of the gully systems, a model relating tensile force at the failure with the area of the scarp covered by roots was evaluated.